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Supreme Court of the United States

October Term, 1937. No. 453.

GENERAL ELECTRIC COMPANY,
Petitioner.

vs.

WABASH APPLIANCE CORPORATION, ABE ADLER and ABE M. PARKER,
Respondents.

BRIEF FOR RESPONDENTS.

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PAGE

INDEX.

	PAGE
Statement of the Case	1
Subject Matter	1
The California Adjudication	4
Summary of Argument	5
ARGUMENT:	
POINT I.—The product claims of the Pacz patent are invalid because of insufficiency of disclosure	6
POINT II.—The product claims of the Pacz patent are invalid because they fail to describe the limits of the monopoly asserted thereby	8
POINT III.—The product claims of the Pacz patent are invalid because admittedly they differ from the prior art only in an indefinitely claimed degree	12
POINT IV.—The product claims of the Pacz patent are invalid because there was no inventive act for the product distinct from that of the process by which the product was made	16
POINT V.—The product claims of the Pacz patent are invalid because of anticipation by and want of invention over the prior art	18
Plaintiff's present commercial process does not use the Pacz process	20
Pacz filament made by North and Padowicz	23
Pacz filament made by Laise	24

PAGE

Plaintiff's Pacz filament made before 1925 exactly like the Pacz filament produced by defendant 25

Summary *re* comparison of real Pacz filament with plaintiff's modern filament 27

Coolidge Patent No. 1,089,233 (R. 254) 27

The disingenuous contentions plaintiff advances in this Court in its attempt to meet the evidence concerning the identity of the Pacz and the Coolidge-Battersea filaments 33

Schaller Patents No. 1,256,929 and No. 1,256,930 (R. 306-310) 36

Kruger Patent No. 1,154,701 (R. 304) 38

Conclusion on the subject of anticipation 39

POINT VI.—The product claims of the Pacz patent are invalid because of prior knowledge and use 40

(a) The Westinghouse *use* 40

(b) The Independent Lamp & Wire Company *use* 41

Plaintiff's contentions concerning prior knowledge and use 44

POINT VII.—The Pacz patent is invalid because of double patenting 46

Plaintiff's contentions on this point 47

Conclusion 50

Cases Cited.

	PAGE
Allen Filter Co. v. Star Metal Manufacturing Co., et al., 30 Fed. (2d) 693	9
Caldwell v. Firestone Tire & Rubber Co., 13 Fed. (2d) 483, 488	47
Egbert v. Lippman, 104 U. S. 343, 346	46
General Electric Co. v. DeForest, 17 Fed. (2d) 90; 28 Fed. (2d) 641; Cert. denied 49 S. Ct. 180	2, 16
General Electric Company v. Nitro-Tungsten Lamp Co., 261 Fed. 601-606	11
Guidet v. Brooklyn, 105 U. S. 550; 26 L. Ed. 1106	14
Hazeltine Corporation v. Radio Corporation of America, 52 Fed. (2d) 504	9
Hartford Empire Co. v. Obear Nester Glass Co., 39 Fed. 769, 771	19
Kwik Set, Inc. v. Welch Grape Juice Co., 86 Fed. (2d) 945, 947	14
Miller v. Eagle Manufacturing Co., 151 U. S. 186	47
Otis Elevator Co. v. Portland Co., 127 Fed. 557	47
Permutit v. Graver Corpn., 284 U. S. 52	7, 8, 10
A. O. Smith Corporation v. Petroleum Iron Works of Ohio, 73 Fed. (2d) 531, 536	9
United Shoe Machinery Corp. v. Brooklyn, 77 Fed. (2d) 263	45
U. S. v. General Electric Co., 272 U. S. 476, 480	2, 12

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Respondents.

BRIEF FOR RESPONDENTS.

This cause is here on writ of certiorari, to the Circuit Court of Appeals for the Second Circuit, in a patent infringement suit involving claims 25, 26 and 27 of Pacz Patent No. 1,410,499, granted March 21, 1922, on an application filed February 20, 1917.

Statement of the Case.

The statement of the case in petitioner's brief is incomplete and contains argumentative assertions as alleged fact which are flatly contradicted by the record. It will, therefore, be necessary for respondents to set forth an independent statement of the case.

Subject Matter.

The patent in suit is directed to the subject of the metallic filament used in incandescent lamps such as have been in

use for many years. Plaintiff-Petitioner, General Electric Company (hereinafter referred to as plaintiff), has for a long time monopolized the lamp industry by means of patents. This monopoly expired several years ago, whereupon competitive enterprise made incandescent lamps available at reasonable prices. Plaintiff has endeavored to recapture its expired monopoly by trivial patents, like the one here in suit.

Originally, incandescent lamps were made with carbon filaments. The patents for the carbon filament lamp (the Edison patents), owned and enforced by the plaintiff, have long since expired. Then came the substitution of tungsten as the material for the incandescent filament. Plaintiff owned and enforced during its life the patent for the tungsten filament (Just and Hanaman patent) which expired in 1929. Then came the drawn tungsten filament. The patent therefor (Coolidge patent) was likewise owned by plaintiff and was vigorously asserted. That patent covered both the process for producing the drawn tungsten filament and the product *per se*. The product claims were invalidated in 1927 (*General Electric Co.* v. *DeForest*, 17 Fed. (2d) 90; 28 Fed. (2d) 641; certiorari denied 49 S. Ct. 180), and the patent expired in 1930.*

Plaintiff's brief (p. 3) admits that tungsten filaments are composed of grains or crystals. Obviously, the only difference that can exist between tungsten filaments must reside either in the *process* of their production, or in differences in the *size, shape or relative location of the grains or crystals of which they are composed.*

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* For an abbreviated history of the foregoing see this Court's opinion in *U. S.* v. *General Electric Co.*, 272 U. S. 476, 480. The decision noted that plaintiff and its licensees controlled 93% of the electric lamp business.

The Pacz patent in suit contains 32 claims, the first 22 of which are directed to the *process* of producing the filament, and the remaining 10 to the *product* allegedly produced by the process. *The three claims involved in the present suit are all for the product.*

Respondent (hereinafter referred to as defendant) does not manufacture filaments, but assembles incandescent lamps, using filament wire bought on the open market from long established manufacturers, viz. Syrian Wire and Contact Company and Callite Products Company. Although these sources of supply were well known to plaintiff, no suit has ever been instituted against them because they did not use the Pacz method. Plaintiff does not use the Pacz method either.

Plaintiff's brief advances the product of the Pacz patent as differing from prior tungsten filaments because it is "sagless" and "non-offsetting." We are not here concerned with "offsetting" because, as plaintiff admits (brief, p. 4) the Coolidge patent of 1913 solved that problem.

Although plaintiff's statement of the case (brief, pp. 5, *et seq.*) seeks to convey the impression that the Pacz product does not sag at all, in the Court of Appeals below plaintiff was forced by the record to admit—and will be here forced by the record to admit—that the Pacz filament is not sagless, but merely does not sag *as much* as prior tungsten filaments. Although the Pacz filament cannot be advanced as 100% sagless, it is conceded by plaintiff (brief pp. 6 and 7) that a 100% sagless drawn tungsten filament (the Schaller filament) preceded the Pacz patent by many years.

The Pacz patent was not the first directed to the problem of minimizing the extent of sag of tungsten lamps filaments. Pacz himself had an earlier patent (now expired) directed to the same problem and plaintiff's brief (p. 35)

admits that its product became available prior to the discovery of the filament of the claims in suit. All that is claimed for the product of the patent in suit is that it does not sag *as much* as the prior Pacz filament.

Neither the specifications nor the claims of the Pacz patent in suit point out in what respect the alleged new product differs from prior products.

The inference is sought to be raised in plaintiff's brief that by practicing the Pacz process the production of sagless filament can be made more certain and dependable than with the process of plaintiff's prior but now expired Coolidge patent the filament of which is characterized "as far from dependable" and "uncertain" (brief pp. 21, 27, etc.). The fact is that even as plaintiff practices the Pacz process today, varying "grades" of filament wire is produced much of which must be rejected because it sags excessively (Jeffrays XQs. 352-363, R. 73-75; XQs. 518-545, R. 234-238). Even if it were true that the Pacz process is better than the Coolidge process, that would not save the product claims because the record establishes the identity of the Coolidge (Battersea) product and the Pacz product.

The California Adjudication.

The claims here involved have previously been held valid by the Court of Appeals in California in a litigation against Japanese defendants (80 Fed. (2d) 958).

Although several of the defenses raised in the California case were raised in the case at bar, the evidence adduced with respect thereto in the present case was different in character and substance. As distinguished from the California case, defendant has established the identity of the Pacz filament with filament which had been used in millions of lamps for many years prior to Pacz so conclu-

sively that plaintiff offered no evidence in rebuttal. The Court of Appeals below invalidated the three product claims in suit on this defense alone, with the statement that it was unnecessary for the Court to pass on the other issues in the case. It is our view, however, that the fair inference to be drawn from the decision of the Court of Appeals below is that, on the present record, if necessary that Court would have invalidated the claims also on account of their indefiniteness, notwithstanding the opinion of the Ninth Circuit Court of Appeals.

Summary of Argument.

The order of argument will follow the defenses in a logical sequence, although this procedure will necessitate deferring a consideration of the specific ground on which the Court of Appeals below invalidated the claims. The order will be as follows:

The product claims of the Pacz patent are invalid because—

(1) of insufficiency of disclosure;

(2) they fail to describe the limits of the monopoly asserted thereby;

(3) admittedly they differ from the prior art only in an indefinitely claimed degree;

(4) there was no inventive act for the product distinct from that of the process by which the product was made;

(5) of anticipation by and want of invention over the prior art;

(6) of prior knowledge and use

(a) by the Westinghouse Company; and

(b) by the Independent Lamp and Wire Company;

(7) of double patenting.

ARGUMENT.

POINT I.

The product claims of the Pacz patent are invalid because of insufficiency of disclosure.

This defense, which alone is dispositive of the case, will be clear on the first reading of the claims in suit.

The claims are for a tungsten filament for incandescent lamps. Taking claim 25 as illustrative:

> "A filament for electric incandescent lamps or other devices
>
> (a) composed substantially of tungsten; and
>
> (b) made up mainly of a number of comparatively large grains *of such size and contour* * as to prevent *substantial* sagging and offsetting during a normal or commercially useful life for such a lamp or other device."

Claim 26 differs from claim 25 only in the introductory phrase, defining the filament as "drawn".

Claim 27 differs from claim 25 only in describing the "substantially pure tungsten" of claim 25 as

> "tungsten containing less than three-fourths of one per cent of non-metallic material".

---

* Italics ours throughout this brief.

Drawn wire filaments were used in incandescent lamps for many years prior to Pacz, which filaments were granular and "composed of substantially pure tungsten" as recited in claims 25 and 26, and of a degree of purity equal to and in excess of that specified in claim 27 (see, for example, the prior Pacz Patent No. 1,299,017, R. 266, lines 95 to 98; and claim 14 of that patent, (R. 269); also the Coolidge patent (R. 255, lines 82-84).

The language which purports to distinguish the Pacz product from the prior products is the last element of each claim, namely, that the filament is

> "made up mainly of a number of comparatively large grains *of such size and contour* as to prevent *substantial* sagging and offsetting during a normal or commercially useful life for such a lamp or other device".

Since this still does not explain, we must turn to the specification and drawings to find just *what* "size" and *what* "contour" of the grains are necessary "to prevent *substantial* sagging and offsetting" during the normal life of the lamp.

The drawings illustrate neither the grain *"size"* nor the *"contour,"* nor the extent of sagging. Likewise, the specification does not even mention the size and contour of the grains and doesn't describe the extent of sagging.

Certainly no authority is required in this Court to support the proposition that a patent is invalid if it fails to show or describe the thing which is claimed as the invention. Indeed, want of the statutory requirement of *description,* alone, is sufficient to invalidate the patent (*Permutit* v. *Graver Corp.,* 284 U. S. 52).

It is therefore obvious that the product claims of the Pacz patent are invalid.

POINT II.

The product claims of the Pacz patent are invalid because they fail to describe the limits of the monopoly asserted thereby.

The claimed product has been called by plaintiff a "sagless" filament. This naturally leads to the query—What is *really* meant by the term "sagless"? Does this mean a filament which does not sag at all? As we have pointed out, plaintiff admits that this is not what is meant because even today, in plaintiff's commercial lamps, allegedly made under the patent in suit, *some* sagging occurs, and batches of wire are often rejected.

Not even the product claims in suit purport to cover a structure which is *wholly* sagless and will be satisfied if "*substantial*" sagging is prevented.

We are therefore met with the queries—How much sagging is permissible within the claimed monopoly, and how much sagging is necessary in order to be outside of the monopoly of the patent? The same queries arise as to the "size" and "contour" of the grains. Answers to these queries are necessary as a matter of law, because, as this Court stated in *Permutit* v. *Graver Corp., supra* (at p. 60):

> "The statute requires the patentee not only to explain the principle of his apparatus (or method) and to describe it in such terms that any person skilled in the art to which it appertains may construct and use it after the expiration of the patent, *but also to inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not*".

(See also *Allen Filter Co.* v. *Star Metal Manufacturing Co., et al.*, 30 Fed. (2d) 693; *Hazeltine Corporation* v. *Radio Corporation of America*, 52 Fed. (2d) 504; *A. O. Smith Corporation* v. *Petroleum Iron Works of Ohio*, 73 Fed. (2d) 531, 536.)

The claims give no information whatever permitting an answer to the query of how little sagging will bring one within the claimed monopoly of the patent, or how much sagging keep one outside that monopoly.

Notwithstanding the silence of the patent on the subject, the matter was thoroughly canvassed by cross examination of plaintiff's expert, Dr. Jeffries, not only by counsel for defendant but also by the Trial Court.

Thus Dr. Jeffries was asked (R. 38, XQ137):

> "Now, what is the measure of whether it is a sagging filament or is not a sagging filament?"

His answer was:

> "The measure is one of *utility.*"

Then, in answer to another question by the Court, he stated (R. 41, fol. 62):

> *"Now, as to just how far one can depart from the perfect patent product toward some other product of the prior art and still remain within the scope of the teachings, I am not prepared to say.*
>
> XQ150. And the patent doesn't say it either, does it? A. Not in any specified numerical figures, no."

We may add that neither does the patent state it in *any way.* When given a definite example, as he was in XQs. 156-158 (R. 43), Dr. Jeffries could not or would not tell whether a filament sagged or not, even though the photographs had theretofore been utilized by the witness to

illustrate to the Court the difference between a sagging and non-sagging filament.

The patent sets up no standard by which the extent of its claimed monopoly can be measured. This is left entirely to the owner of the patent, based, as its expert stated, on the "utility" of the product. *In other words, if the wire is commercially useful, the plaintiff claims that the patent covers it.* No such extraordinary situation is supported by common sense or any legal authority and the claims are invalid because they do not define the limits of the monopoly with regard to the extent of sag.

For the same reason, the claims are invalid because of want of limitations as to "size" and "contour" of the tungsten grains.

The astonishing fact is that in the *only* three respects—viz: grain size, grain contour, and extent of sag—in which the product of the patent purports to differ from the prior art, neither the specifications nor the claims define or so much as suggest *any* limits. Apparenty plaintiff refrained from illustrating, describing or claiming in the Pacz patent *what* size, contour, and sag fall within or without the patent so that it could assert as it now does that the size, contour and sag of all *prior* filaments were *different* from Pacz, but that the filament of *defendant's* lamp, and of all other *competing* lamps, are *identical* with Pacz. This is not permissible (*Permutit* v. *Graver, supra*).

Not even Dr. Jeffries' naive "utility" test will save the claims.

The Pacz patent (p. 2, lines 111 *et seq.*) points out that all of the filaments employed in the lamps illustrated by Figures 1, 2 and 3 of the drawings are "coiled" like the filaments of the Langmuir gas filled lamp patent No. 1,181,059. Plaintiff's brief as well as the patent in suit stress the im-

portance of a sagless *coiled* filament particularly for gas filled lamps.

If Pacz was the originator of the sagless filament then the Langmuir lamp could not have been produced prior to Pacz so as to have the normal or commrcially useful life recited in the claims.

Let us see, therefore, what the facts are with respect to the Langmuir lamp. We first note that the Langmuir patent is owned by plaintiff, General Electric Company (R. 274). Next we note that it *describes and illustrates in its drawings the identical coiled tungsten filament lamps that are illustrated in the drawings of the Pacz patent.* The Langmuir patent says (p. 1, lines 58-61):

> "the lamp has *substantially the commercial useful life* of standard lamps on the market at the present time, the drawn-wire tungsten lamps."

Obviously, if this statement in the Langmuir patent is true, then the "utility" test of Dr. Jeffries is met, and this alone establishes the want of definiteness of the Pacz claims and their invalidity.

The commercial success of the Langmuir patent *as early as 1914* was judicially determined at plaintiff's solicitation in *General Electric Company* v. *Nitro-Tungsten Lamp Co.* (261 Fed. 601-606). The Court there said (at p. 607):

> "The Langmuir lamp has proved *extraordinarily* successful"

and quoted, at length, from a laudatory description published in the 1914 edition of the leading electrical engineering hand book, partly as follows:

> "Nitrogen-Filled Lamps.—This type of lamp has a closely *coiled helical filament of drawn tungsten wire* mounted in a glass chamber filled with nitrogen

> or other inert gas. The pressure of the gas retards the decay of the filament, so that it may be operated with a *satisfactory life* at a higher temperature than is practicable in a vacuum."

This Court commented on the same patent in *United States* v. *General Electric Company*, 272 U. S. 476 (at p. 480):

> "The General Electric Company is the owner of three patents—one of 1912, to Just & Hanaman, the basic patent for the use of tungsten filaments in the manufacture of electric lamps; the Coolidge patent of 1913, covering a process of manufacturing tungsten filaments by which their tensile strength and endurance is greatly increased; and, third, the Langmuir patent of 1916, which is for the use of gas in the bulb by which the intensity of the light is substantially heightened. These three patents cover completely the making of the modern electric lights with the tungsten filaments and secure to the General Electric Company the monopoly of their making, using and vending."

It follows, therefore, that the Pacz product claims are invalid because of their indefiniteness.

POINT III.

The product claims of the Pacz patent are invalid because admittedly they differ from the prior art only in an indefinitely claimed degree.

We again ask: How much sagging and what grain "size" and "contour" will be within the claimed monopoly of the patent, and how much sagging and what grain "size"

and "contour" will be outside the monopoly? The answer to this is particularly necessary in the present case because the patent is not and does not even pretend to be a pioneer in the field of decreasing the degree of sag in tungsten filaments.

As stated by plaintiff's expert, Dr. Jeffries, the well known thoriated tungsten filament employed in lamps sold by plaintiff and its licensees by the millions under Coolidge Patent No. 1,082,993 (R. 254) since 1912-1913 was concededly a marked improvement, with respect to sagging and offsetting, over the tungsten filaments employed in lamps sold in vast quantities prior thereto (R. 54). The evidence of Dr. Jeffries continues:

> "XQ222. And along comes Pacz by the patent for which he applied in 1914 (the prior Pacz patent), and he produced a filament which would not offset and which would not sag as much, is that right? A. That is what is stated here in the patent.
>
> XQ223. That is what it means to you as you testified? A. That is correct."

Then, finally, three years later, along came Pacz with his application for the patent in suit and claimed, not that the product did not sag at all, but merely that it did not sag as much as the prior Coolidge and Pacz products.

The title of the prior Pacz Patent, No. 1,299,017 (R. 266) is the same as of the patent in suit, namely "Metal and Its Manufacture". It is directed to the production of non-sagging, non-offsetting drawn tungsten filaments.

After describing the sagging and offsetting difficulties of the prior art the patent describes its new product as follows (line 98):

> "These metals were pliable and showed no offsetting after continued use as filaments in incandescent

> lamps. *Moreover coiled filaments made from this metal retained their shape to a very high degree after continued use.*"

Plaintiff's brief (p. 35) admits that the earlier Pacz patent was directed to the production of non-sagging, non-offsetting filaments.

Both as a matter of description contained in the prior Pacz patent, and as a matter of evidence, the lessening of the sagging of a tungsten filament has been *chronologically progressive;* and the most that is or can be claimed for the product of the Pacz patent in suit is that it sags *less* than the filament wires which preceded it.

In other words, the invention claimed for the Pacz patent is a mere difference in *degree* of sag, a mere difference in *degree* of grain size, and a mere difference in *degree* of grain contour.

That mere change in *degree* does not constitute a patentable invention is too well settled to need extensive citation of authority. The leading case in this Court is *Guidet* v. *Brooklyn,* 105 U. S. 550, 26 L. Ed. 1106. This Court there said:

> "This was simply carrying forward the old idea, and doing what had been done before in substantially the same way, but with better results. *This change was only in degree, and consequently not patentable.*"

In a more recent application of the same principle *Kwik Set, Inc.* v. *Welch Grape Juice Co.* (86 Fed. (2d) 945) the Court said (at p. 947):

> "A patentee may not arbitrarily select a point in a progressive change and maintain a patent monopoly for all operations in that progressive change falling on one particular side of that arbitrarily selected

> point. *It is only where the selected point corresponds with the physical phenomenon and the patentee has discovered the point at which that physical phenomenon occurs that the maintenance of a patent monopoly is admissible*".

The Pacz claims are obviously invalid because they distinguish from the prior art only in *degree* and that indefinitely defined.

Plaintiff seeks in its brief (pp. 44, 47) to avoid this inevitable consequence by an erroneous application of several authorities, the one most stressed being *Eibel Process* v. *Minnesota* (261 U. S. 45). Obviously, that case has nothing in common with the present. There the patentee did not merely "carry forward an old idea" and obtain a patent for a mere *change in degree.* As this Court said (at p. 67):

> "Eibel's high or substantial pitch was directed toward a wholly different object from that of the prior art."

Even if contrary to fact we assume that Pacz had clearly described and defined the degree of change in sagging, grain size and grain contour, it could not be said that those changes in degree were "directed toward a wholly different object from that of the prior art". The opposite is admitted by plaintiff.

In the final analysis, the sole reason for reducing the sagging of filaments is to insure a normal, useful life for the lamp. Millions of lamps have admittedly been made and sold by plaintiff and its licensees under the Just and Hanaman, Coolidge, and Langmuir patents, and presumably also under the first Pacz patent. All these lamps had a normal useful life. There is not one word in the Pacz patent, nor one word of evidence in this case, that the prod-

uct of the Pacz patent in suit has lengthened the normal useful life of a lamp by one minute.

The claims define a product differing from the prior art merely in the *extent* of sag, produced solely by mere variation in the degree of "size and contour" and are, therefore, invalid.

POINT IV.

The product claims of the Pacz patent are invalid because there was no inventive act for the product distinct from that of the process by which the product was made.

This defense is one of those sustained by the Courts of the Third Circuit in invalidating the product claims of the Coolidge patent referred to. This patent, like the patent in suit, claimed both the process and the product. In that case, unlike the present one, both process and product claims were involved.

Coolidge defined the product as a "wire formed of ductile tungsten" (claim 24); "an incandescent electric lamp having a filament of drawn tungsten wire" (claim 25); "substantially pure tungsten having ductility and high tensile strength" (claim 26); "a ductile tungsten wire having a fibrous structure" (claim 27), etc. Thus, in terminology, as well as in form, Coolidge's product claims are comparable in every respect with the Pacz claims.

The desirability of a ductile tungsten filament had long been recognized before Coolidge, just as here the desirability of a sagless filament had long been recognized before Pacz. Judge MORRIS presented the question of law thus (17 Fed. (2d), p. 98):

> "Are the product claims also wanting in patentable subject matter * * * because there was for the product no inventive act distinct from that of the process by which the product was made?"

The opinion pointed out (at p. 101):

> "Drawn tungsten was conceived of and recognized by others prior to the earliest possible effective date of the patent in suit as a means for better satisfying the want that existed in the incandescent lamp industry * * *. The only problem that remained after the conception of drawn tungsten and the recognition of that idea, when embodied in tangible form, as an effective means of accomplishing the desired result had to do with an entirely different matter—*the means (that is, the process) for producing that article.*"

There was no inventive concept in a *product* consisting merely of a filament composed of grains having "such" shape and contour as to be sagless. If any invention was involved, it must have consisted of the process.

It is submitted, therefore, that for this reason also the three product claims are invalid.

POINT V.

The product claims of the Pacz patent are invalid because of anticipation by and want of invention over the prior art.

In connection with this defense it is necessary to examine the disclosure of the patent in somewhat greater detail and also to consider plaintiff's utilization of the alleged invention of the patent in its commercial operations.

First, with respect to the disclosure of the patent. To what, in the Pacz process, is attributed the claimed non-sagging characteristic of the wires? Plaintiff attributes it to the addition to the tungsten of substances which will form *alkali-silicates.*

Obviously, if the addition of an alkali-silicate to tungsten will make the grains grow to just the right size and shape for Pacz, it will do so for anyone else.

With respect to commercial success, although plaintiff contends that all of its lamps for many years have utilized the "218" sagless filament of the Pacz patent, Dr. Jeffries was forced to admit that the process, as well as the materials employed in plaintiff's commercial operations, differ in many important respects from the patent. There is no evidence in the case, other than the assertion of plaintiff's expert witness, that the process and ingredients specified by the patent were ever used commercially by plaintiff or anyone else. In consequence, plaintiff's whole case is predicated on a comparison between plaintiff's *present commercial product* and defendant's product, and no evidence was offered by plaintiff to make any comparison between defendant's product and *the disclosure of the patent.* As was

stated by the Court in *Hartford Empire Co.* v. *Obear Nester Glass Co.*, 39 Fed. 769 (at p. 771):

> "So, commercial devices are not to be compared with commercial devices, but the accused commercial device is to be compared with the claims of the patent in dispute."

Although quantities of plaintiff's commercial "218" wire were produced, *not one inch of wire was produced by plaintiff made in accordance with the process of the patent.*

To permit an intelligent evaluation of the Pacz product, defendant established, from two independent, unimpeachable sources, by evidence so conclusive in character that it was not rebutted, that by following the patented process, one skilled in the art could not produce the sagless filament which plaintiff now makes and which it alone advances as illustrative. The filament thus produced had the same sagging and offsetting properties as the tungsten filament of the prior commercial art.

In addition, defendant produced microphotographs of plaintiff's "218" wire, which were taken in *plaintiff's* laboratories just after the issuance of the Pacz patent. These show what the grain structure of the Pacz or "218" filament was like that plaintiff was using at that time. These microphotographs likewise undisputably show that plaintiff's real Pacz filament differed in every material respect from what plaintiff now calls the Pacz wire, and differed in no respect from what defendant's evidence established was the best that could be produced by following the process of the patent. This evidence established the additional fact that the real Pacz filament differed in no respect from the prior Coolidge Battersea filament.

Plaintiff's present commercial process does not use the Pacz process.

The process described in the patent consists of the following steps:

(1) A solution "A" is formed by dissolving in water, filtering and diluting a paste formed of a fusion of 1400 grams of tungstic acid, 620 grams sodium carbonate, 620 grams potassium carbonate, and 300 grams sodium nitrate (R. 247, lines 89 to 105).

(2) A mixture is then made of 180 grams silicic acid, 620 grams K_2CO_3, and 150 grams N_aNO_3 to form solution "B".

(3) The third step of the process consists of boiling a mixture of specific quantities of solutions A and B, and pouring it into a boiling solution of a specific quantity of HCL and water, precipitating, and *washing the precipitate until the filtrate becomes milky.* The precipitate is then dried and reduced to a "metal A". The metal A may be formed into slugs "which may be drawn into filaments having the non-sag and other characteristics hereinbefore described" (R. 247, line 106 to p. 248, line 28).

(3a) Instead of using the metal A to produce the filament an alternative procedure is described which requires further processing of the metal A as follows:

A specific quantity of metal A is mixed with a specific quantity of the oxide from which the metal A was reduced, which mixture is then reduced to form a metal B, which is drawn to form a sagless filament (R. 248, lines 31 to 41).

(3b) As a modification, solution B may be added directly to the fusion from which solution A is made, by utilizing the "proper" proportion of solution B

in making the paste which is dried and fused and dissolved to form solution A.

For reasons which will later be obvious, we emphasize the washing operation. All that the patent specification says with respect to this is contained in the sentence (R. 248, line 17):

> "The precipitate is then washed with hot H_2O until the filtrate becomes milky."

(4) Finally, in utilizing the wire as a lamp filament, *i. e.*, in producing an incandescent lamp, the patent instructs that it is necessary to subject the lamp to a "preliminary heat treatment or aging" (admittedly old in the art of incandescent lamp manufacture; see R. 49). The Pacz patent, however, specifies a procedure of treatment, consisting of passing a current at 30 volts through the filament for two minutes, and then, at steps at 5 volts, for two minutes each, up to 60 volts, with a final treatment of fifteen minutes at 115 volts, viz.: *a total treatment of approximately thirty minutes.*

Plaintiff's commercial process does not use the specified ingredients, the specified proportions, the specified solutions, the specified process steps, nor the specified flash aging. We note the following six material differences:

(1) Jeffries said (R. 47):

> "The present commercial operations of the General Electric Company do not follow the proportions recited in this paragraph of the patent."

This change was made in 1921 or 1922 (XQ179, R. 47).

(2) Plaintiff does not make the Solution A as provided in the patent (XQ180). Instead of making the two separate

Solutions A and B, they make *one* solution. This change was also made in 1921 or 1922 (XQs. 181-182, R. 47).

(3) In answer to XQ186, Jeffries pointed out that the additional step of *analyzing* and *adding materials* is practiced by plaintiff.

(4) The flash-aging schedule as provided in the patent has been changed so that in accordance with the present practice it runs for a *few* minutes instead of the *thirty* minutes called for by the patent (XQs. 312, 313, R. 69).

(5) No sodium carbonate is used by plaintiff, although this is specified by the patent (R. 247, lines 89, *et seq.*) (XQ314), no potassium carbonate is used (XQ315), and no sodium nitrate is used (XQ316). Other salts are now used by plaintiff (RXQs. 459, 461, R. 86).

(6) As to the step of *washing*, Dr. Jeffries said (R. 224):

> "In carrying out the Pacz process according to the patent, *the degree of washing that is done affects the final result.*"

During his direct examination in *prima facie* (R. 44) starting with reading from page 2, line 17 of the patent, he stated:

> " 'The precipitate is then washed with hot H_2O until the filtrate becomes milky,' *that is an incomplete washing, which the specification of the patent in suit describes.* In the present process the washing is more complete and then the resulting oxide is analyzed for alkali metals and other silica, and it is usually found that the percentage of these materials remaining in the oxide is less than that which is desired. After analysis, potassium salts, sodium salts and compounds of silica are added to the tungsten oxide

mixture to bring the total quantities of these substances up to *a certain fixed amount.*"

However, defendant did not rest this phase of the case on plaintiff's failure to escape the logical consequences of Jeffries' admissions, and on plaintiff's failure to produce any real Pacz filament. As above stated, defendant produced filaments, lamps made with such filaments, and microphotographs of such filaments to show the real product of the Pacz patent.

Pacz filament made by North and Padowicz.*

The witnesses North and Padowicz produced tungsten filament made strictly in accordance with the Pacz patent (R. 171, 172, 174). Defendants' Exhibit I are microphotographs of such filament. (See Fig. 1 of attached fly leaf).

North has been manufacturing tungsten compounds since 1921, and has been supplying such compounds for the filament wire of defendants as well as to the Westinghouse Company, one of plaintiff's large licensees. *He has never, in his fifteen years of manufacturing experience, supplied anyone with tungstic acid compounded in the manner specified in the Pacz patent* (Q16, R. 172). Padowicz was the metallurgical engineer of one of the suppliers of defendant's filament wire.

The lamps made in accordance with this North-Padowicz wire are Exhibits SS, TT and VV. According to Padowicz (R. 175), the filament had only a few elongated crystals, *and many fine block type rings (small grains),* character-

* For the convenience of the Court we have attached as a rear fly leaf to this brief an extensible sheet upon which have been reproduced the various microphotographs which will be referred to in this discussion. In some instances the *exhibits* consist of a number of microphotographs from which typical examples have been selected.

istic of sagging filaments. And the lamp made with such filament sagged, and kept on sagging after the flash-aging (Q16, R. 176).

When Jeffries was shown Exhibit I, *with the typewritten description concealed,* he said (XQ429, R. 79):

> "I can say that the structures are not typical of the preferred Pacz filament at any rate.
>
> None of the photographs is typical of the preferred Pacz filament. And when I say preferred Pacz filament I mean the Pacz filament that goes into commercial use. In other words, my answer was intended to mean that none of those microphotographs is typical of the Pacz 218 filament wire sold or used commercially by the General Electric Company for incandescent lamps."

Once Jeffries found out that Exhibit I was a microphotograph of Pacz wire, he tried to modify his testimony and said (R. 226):

> "The representation of the structure produced supposedly in accordance with the Pacz patent in suit is a very poor reproduction of the Pacz product. It is not representative of the Pacz product, although it is obvious that the product has some of the characteristics of the Pacz product."

Pacz filament made by Laise.

Laise testified (R. 158) that he made up three lots of wire in accordance with the Pacz patent, and demonstrated by Exhibit T (See Figs. 2A and 2B on fly leaf) that such wire will be exactly like the wire shown in Exhibit I (Fig. 1), the North-Padowicz wire. The first batch sagged 38mm., the second 2.5 to 18mm., and the third 18 to 50mm. The commercially permissible sag is 5mm. (Q120, R. 159).

The Pacz patent provides:

> "The tungsten ingots produced according to my invention usually have fine grains, as for example between 2500 and 6500 grains per square millimeter" (p. 248, lines 77-80).

The ingots or slugs that Laise made in accordance with the patent were all within these limitations, *i. e.*, 2500 to 3800. *Jeffries admitted* (R. 78) *that the grain count of plaintiff's modern ingots is 20,000 to 30,000.*

All Jeffries had to say about Exhibit T is (R. 223):

> "Defendants' Exhibit T is a chart of microphotographs supposed to represent filaments made according to the Pacz patent in suit. None of those filaments represents the Pacz structure. None of them would give a commercial non-sag filament."

From the foregoing it will be apparent that plaintiff refrained from producing filament made in accordance with the Pacz patent *because it was aware that the patent produced nothing comparable to the present commercial wire, nor the sagless filament claimed.*

Plaintiff offered no evidence to rebut the testimony and exhibits of North, Padowicz and Laise.

Plaintiff's Pacz filament made before 1925 exactly like the Pacz filament produced by defendant.

The Kober Testimony. Kober was employed by plaintiff from 1923 to 1926 *to improve the non-sag characteristics of what was then the Pacz filament.* For this purpose he treated the filament, examined it microscopically, and gave it many other tests in thousands of lamps in the laborato-

ries, as well as in the factories of plaintiff (R. 106). In 1923 he found (R. 106):

> "in running many tests and observing many thousands of lamps in those tests as well as production lamps in the factory, that—I *found no lamp that didn't sag after flash-ageing.*
>
> Q26. Were these lamps that you examined as part of your research work on this problem, were they commercial lamps put out by the General Electric Company? A. Part of them were commercial lamps and part were experimental lamps; but the experimental lamps were essentially the same as the factory lamps."

Kober's contemporaneous report and the photographs (R. 281, 282) forming part of Exhibit L, leave no doubt that as late as 1923 the so-called Pacz wire (or C wire as it was then also called) was a sagging wire, and that it sagged a little less than the B wire which was plaintiff's *thoriated* wire (Fonda XQ53, R. 94; Kober, R. 106; Cowles Qs. 35, 36, R. 120). The microphotographs appearing on page 3 of the Kober report (R. 281) and the sketch thereof (R. 282, Fig. 3 of the fly leaf) *show that this C or Pacz filament that the General Electric made in 1923 was exactly like the real Pacz filament that North and Padowicz made, and like the real Pacz filament that Laise made.* Just as Padowicz, North and Laise, Kober also found that the Pacz filament had some large grains as well as many small grains.

As late as 1925, plaintiff's publication "Exhibit W" (Kober R. 130) said:

> "A great deal of work has been carried out, both here and abroad, on processes for producing a wire in which *the crystalline structure is such as to form a wire of pronounced non-sag quality. Such a wire*

may be useful in certain types of lamps. Considerable progress has been made by the laboratory in this direction.''

The "considerable progress" undoubtedly referred to Kober's work, and shows that *even in 1925 the sagging problem had not been solved.*

The Cowles Testimony. A second witness who testified about plaintiff's early Pacz wire is Cowles. He produced microphotographs P to P3 (R. 125, 126) of plaintiff's 1922 Pacz metal, and a microphotograph of the filament made from such metal, Exhibit Q (R. 126). *This microphotograph* (Fig. 4 of the fly leaf) *was prepared in the Harrison Plant of plaintiff in 1922.* According to Cowles (Qs. 130, 131, R. 132) the size and contour of the grains of Pacz filament varied throughout its length; some were large and some were small. The Cowles testimony was strictly in accordance with what Kober found in 1923, and what North, Padowicz and Laise found with filament produced in accordance with the patent. *Plaintiff did not deny or rebut the Cowles testimony.*

Summary *re* comparison of real Pacz filament with plaintiff's modern filament.

The foregoing establishes that the process of the Pacz patent will not produce plaintiff's present commercial filament. On the contrary, it produced a different product which is identical in every material respect with that of the prior Coolidge patent.

Coolidge Patent No. 1,089,233 (R. 254).

The Coolidge patent is referred to in the Pacz patent in suit, and was treated very cautiously by plaintiff's expert. When Dr. Jeffries spoke of it in his direct testimony, and

when he demonstrated the nature of the Coolidge wire, he always spoke of *thoriated* tungsten. In his exhibits he sought to convey the idea that the Coolidge patent had to do solely with the addition of *thoria* instead of an alkali silicate to tungsten. *Thoria,* he explained, produces a *fine grained* structure which, while it will not offset, will sag badly. To improve this and to produce *large* grains, Pacz added *alkali silicates* instead of *thoria.* As far as his direct testimony revealed, the Coolidge patent spoke only of *thoriated* tungsten wire.

In all of plaintiff's exhibits where Pacz is compared with Coolidge, the comparison is with *thoriated* Coolidge filament (R. 63, XQ265). In plaintiff's brief before this Court, and of the microphotograph (Fig. 2) and the enlarged photograph (Fig. 3) on the fly leaf, only the *thoriated* Coolidge filament is illustrated.

Now, the fact is that the thoriating process is only *incidentally* described in the Coolidge patent. The Coolidge patent deals primarily with the so-called "Battersea" process, which is the *preferred* process, and the ten-page specification of the patent deals only in one short paragraph (R. 260, lines 1-35) with the *thoriated* process. All the rest of the specification has to do with the Battersea process (Jeffries, R. 63, XQs. 267, 268). *In practicing the Battersea process alkali silicates and not thoria are added to the tungsten.*

The Coolidge patent states (R. 255, lines 70, *et seq.*):

> "The tungstic oxide thus purified is heated in a gas furnace for about five hours in a covered Hessian or Battersea crucible of the ordinary and well known type, after which step it is found to be coarser and of higher density and to contain matter, probably volatilized from the crucible, the effect of which as will be hereinafter explained, is beneficial."

After stating that the substances thus absorbed by the tungstic oxide from the crucible he will thereafter call "additions," Coolidge states (beginning line 85)

> "If on analysis it is found that less than say 0.8 of one percent. of additions is present, the operation of firing in the Hession or Battersea crucible is repeated as many times as may be necessary, a new crucible being used each time."

Jeffries definitely says in his answer to Q559 (R. 239), that the Battersea wire contains *a minute amount of alkali silicate,* and, of course, only a minute amount is added by Pacz (as low as 1/20th *i. e.*, 0.05 of one per cent.).

The Hession or Battersea crucibles that Coolidge used in his preferred process always contained silicates (Jeffries XQ272, R. 64). And they always contained some alkali metals so that alkali silicates were always added to the tungstic oxide when it was fired in the crucible (XQs. 408-410, R. 79).

Here again, defendant did not rest its case on inferences.

Jeffries admitted that Coolidge-Battersea wire was sold by plaintiff commercially as lamp filament, including coiled filament at least as early as 1913 (XQs. 305-309, R. 67, 68).

Cowles testified that from 1912 to 1920 he was employed by the Independent Lamp & Wire Company (R. 119, fol. 170):

> "*We used the Battersea material instead of the thoriated material because that* seems to give a better *—did not sag and produced a filament that would stand up better* in the C type of lamp."

Laise testified (Q. 91, R. 152):

> "we produced *millions of meters of Coolidge filament with the Battersea process* that was *commercially*

non-sag filament, and by making these sag tests we would eliminate, or we could eliminate the high sagging lots of metal from those that had very little sag. And we usually confirmed these sag tests by making preliminary lots of lamps commercially from a particular lot of wire, and then if these lamps showed an excessive sagging commercially those lots of wire were not used for filament manufacture at that time."

Defendant produced two witnesses, Spielholz and Laise, who, independently, and Spielholz without any thought of this trial, made lamp filaments strictlly in accordance with the Coolidge-Battersea process; made microphotographs of the filament, and Laise produced lamps with the Battersea filaments. These microphotographs and Laise's lamps show that *the Battersea process produces a filament which is at least as good, as far as non-sag and non-offset qualities are concerned, as the filament made in accordance with the Pacz patent.*

In this connection we first call attention to Exhibit J (Fig. 5 of the fly leaf) which is a microphotograph of Spielholz' Battersea filament made up strictly in accordance with the Coolidge patent (R. 138, 139). When Jeffries was shown this exhibit, without being told its origin, *he would not commit himself as to whether it showed Pacz filament or not.* Part of his testimony is as follows (R. 80):

"XQ438. And you have never seen that structure in the so-called 218 Pacz filament, that is, the structure shown in the microphotograph? A. I would not say that I had not seen structures that resembled this somewhat, but I say *it is not typical of the preferred product of the Pacz patent:*

And I wish to say that I do not know anything about the previous heating and mechanical treatment

of the material from which that micrograph was taken.

XQ439. *Would you be prepared to say, Doctor, that this microphotograph might have been taken from a Pacz filament?* A. *No, I would not be prepared to say that it might have been.*

XQ440. *Would you be prepared to say it was not?* A. *No, I would not go that far.*"

It is quite obvious that Dr. Jeffries suspected that Exhibit J, Fig. 5 represented either a real Pacz filament or a Coolidge-Battersea filament, and knowing that the two products are identical, did not dare to commit himself.

Cowles compared Exhibit J (Fig. 5) with Exhibit Q (Fig. 4), that is to say, he compared Spielholz' Coolidge-Battersea filament with plaintiff's vintage of 1922 Pacz filament and found them to be identical (R. 129).

Exhibit K contains the microphotographs of three batches of Coolidge-Battersea wire made by Laise. Jeffries, in cross examination during the *prima facie* case, compared this exhibit with Plaintiff's Exhibit 30 (see Fig. 6 of fly leaf attached to plaintiff's brief) containing the microphotographs of defendant's wire. *The designation of the exhibit that it represents the Coolidge-Battersea process was covered up at that time.* He marked certain photographs "A" and "B" (see Figs. 6A and 6B attached to the fly leaf of this brief) and said (XQ473, R. 100):

> "If one were judging from those two microphotographs alone in the very restricted length shown and could be absolutely assured that the rest of the length of the filament has the same grain contour and the same grain size, *the two micrographs could be described as representative of non-sag and non-offsetting tungsten filament.*"

Laise testified (R. 151, Q89 *et seq.*) that the filaments were made up *strictly* in accordance with the Coolidge-Battersea process. In answer to Q91, R. 152, he said:

> "I made four different lots of Coolidge wire and took the sag test on the same. By measuring the droop or sag of a hairpin filament taken from these lots at 100 mil. in Lot No. N971, which was the first lot, we had a sag of 48 millimeters; Lot No. N989, we had a sag of 1 to 2 millimeters; Lot No. N991, we had a sag of 2 millimeters; and Lot No. N5143, a sag of 4 to 9 millimeters."

The last lot was made in accordance with the Coolidge *thoriated* process, the other three lots in accordance with the Battersea process. *Two of the Battersea process filaments showed a sag of 1 to 2 mm., better than anything that Laise could produce in accordance with the Pacz patent, and within the limits (5 mm.) prescribed today by the General Electric Company in its sag test.* The first lot sagged badly (48mm.), but two lots made in accordance with the Pacz patent sagged just as badly (see Exhibit T). In addition to this, Laise produced lamps Exhibits EE, FF, GG, containing the Coolidge-Battersea filament which (R. 153, Q96):

> "have not got an undesirable sag; they are commercial non-sag lamps."

There was no reply to this by plaintiff.

We invite comparison of Exhibit K (Figs. 6A and 6B of fly leaf) with the other exhibits showing the Pacz filament (Figs. 1 to 4 of the fly leaf) Cowles (R. 130) and Laise (R. 151, 152) testified that the grain structure shown in K is just like that shown in Exhibit Q (Fig. 4 of fly leaf).

Defendant has established beyond doubt (*and the evidence was neither rebutted nor denied*) that as far as the

size and contour of the grains and the non-sag and non-offsetting characteristics of a lamp filament are concerned—the same result will be obtained whether the filament is produced in accordance with the Pacz process or in accordance with the Coolidge-Battersea process.

The product claims are invalid because they do not differentiate from the Coolidge-Battersea product and Coolidge makes as good a disclosure as Pacz of the addition of alkali silicates which allegedly produces grains of "such size and contour" as will prevent "substantial" sagging and offsetting.

The disingenuous contentions plaintiff advances in this Court in its attempt to meet the evidence concerning the identity of the Pacz and the Coolidge-Battersea filaments.

Although it offered no evidence of any kind, other than the argumentative oral testimony of its expert witness, to rebut the foregoing facts, plaintiff advances some novel and astonishing arguments in its brief.

Thus, plaintiff answers (pp. 47 and 48) the evidence concerning the Pacz and Coolidge filament made by North, Laise, Padowicz, Spielholz, and produced by Cowles & Kober, not by showing that the *facts* were different but by citing authority to the effect that when one desires to produce a failure he always scores a success. Why did plaintiff refrain from proving its own Coolidge-Battersea and original Pacz "success"?

This is a case where defendant established *facts concerning plaintiff's own operations, and this was made necessary by plaintiff's silence on the subject.*

It is significant that plaintiff makes no reference to the testimony of its ex-employee Kober, or to Exhibit L (Fig. 4)

produced by him, nor to the evidence of its ex-employee Cowles concerning the microphotograph, Exhibit Q (Fig. 4 of the fly-leaf), nor to the testimony of Spielholz.

Plaintiff *argues* that the Coolidge-Battersea filament is identical with thoriated filament (p. 14), viz.: that they were both fine grained structures.

Since it is obvious that the addition of an alkali silicate to tungsten will have the same result in both processes, plaintiff finds it necessary to say by implication that in the Coolidge-Battersea process *no* alkali silicate is added to the tungsten. The brief labors to raise that inference, without saying it in so many words. For instance (p. 24):

> "Coolidge adds alumina and *silica* at the beginning of his process, whereas Pacz adds *alkali-silicate* at the beginning of his." (Italics plaintiff's.)

and mentions that difference as the only "important point of difference" between them.

Plaintiff's difficulty is with the facts. Dr. Jeffries testified (Q559, R. 239):

> "I think the Battersea alkali metal content is around 1%, and by alkali metal content I mean potassium oxide and thorium oxide added together. It is obvious therefore that the Coolidge-Battersea oxide could not contain very much alkali metal. Although it contains ample silica it could not contain more than *a minute amount of alkali silicate.*"

See also Jeffries' testimony in cross examination XQs. 408-410 (R. 79). To the same effect is the undisputed testimony of defendant's witnesses.

In the Court below plaintiff asserted that insufficient alkali silicate was imparted to the tungsten from the Battersea crucible in the Coolidge process to have the desired effect. That contention is not here made by the plaintiff

because it involved the admission that a *small* amount of alkali silicate was, in fact, added by Coolidge. We repeat in this connection that the Pacz patent (R. 248, lines 80-85) makes it clear that while there may be a limit to the *maximum* amount of the non-metallic (alkali silicate) material, there is no lower limit. The specification says:

> "In the case of the '218' ingots analyses have shown that the percentage of non-metallic material is below 2/10ths of 1% and in many cases below 1/10th and even 1/20th of 1%." (*i. e.*, 0.2 and 0.05 of one per cent.)

We shall not burden the Court by answering each assertion of plaintiff concerning Laise's testimony. We make the unqualified statement that plaintiff's charges are untrue, and that there is nothing in the Laise testimony or elsewhere which supports them. The passages of the Laise deposition referred to by plaintiff do not deal with Laise's production of Pacz and Coolidge filaments. Plaintiff has attempted to take one word or phrase from one part of the Laise deposition, combine it with a word or phrase taken from another part and build up a hypothetical answer never given to a hypothetical question which was never asked.

Finally, and as complete answer to plaintiff's contentions with respect to the Coolidge-Battersea filament, we again direct attention to the Langmuir Patent No. 1,180,159 (R. 272). *Obviously the commercial life of the Coolidge filament-equipped Langmuir lamps could not have been satisfactory if the filaments sagged "substantially".* It follows that the millions of Langmuir lamps that were sold prior to Pacz (as well as more than two years prior to his application for patent) were "substantially" sagless to the same extent that is claimed for the Pacz product. Since such result could only be brought about by a grain

size and contour "such" as to prevent "substantial sagging and offsetting during a normal or commercially useful life of the lamps" as recited in the Pacz product claims, these claims must be completely anticipated by the Coolidge and the Langmuir patents.

Schaller Patents No. 1,256,929 and No. 1,256,930 (R. 306-310).

These patents were filed on May 16, 1914, almost three years before the filing of the Pacz application. They disclose the process of making what plaintiff's expert agrees is the only true non-sag, non-offset tungsten filament. (Jeffries, XQs. 318-327, R. 69, 70.)

That the Schaller patents are not just paper patents, but represent something that went into commercial use is established by the testimony of experts for both parties. Plaintiff's brief admits this (p. 7), although the District Court, whose erroneous conclusions and findings were corrected by the Court of Appeals, stated, in the face of the evidence to the contrary:

> "It has been proven that the earlier patent was not a success commercially or otherwise and taught the art nothing of a substantial nature."

Defendant produced (Exhibit *C*) samples of the Schaller filament which Jeffries readily identified (R. 70). Jeffries knew all about the Schaller filament for many years. Laise built lamps with it, Exhibits DDD and GGG, and testified as to the excellence and commercial use of the Schaller invention.

The argument against Schaller which was developed on rebuttal and which plaintiff here advances, is that whereas Schaller makes a *single* long crystal which gives him a 100%

non-sag, non-offset filament, Pacz makes a *multi-crystal* structure, is contrary to fact and common sense.

It is not true that a Schaller filament consists only of a single crystal. Schaller produced *long* crystals (around seven inches in length), but more than a foot of wire is needed to form the filament of a lamp.

Laise definitely says (Q386, R. 244):

> "I have seen some Schaller filaments several feet long *consisting of more than one crystal.*"

This is fully borne out by Kober, who, in practicing the Schaller process while connected with plaintiff, produced (as evidenced by Exhibit L), lamp filaments consisting of long, overlapping crystals, and not of a single crystal. The fact is, as clearly brought out in the Kober memoranda, that the Schaller heat treatment will convert the small crystals that one finds in the Coolidge thoriated wire and the Pacz wire, into long crystals.

Plaintiff's attempted differentiation between Schaller and Pacz becomes ridiculous on analysis.

In the first place, plaintiff does not suggest that the alleged multi-grain product is *better* than the single-grain product. Quite to the contrary, it admits that the single grain product is the only *100%* sagless and non-offsetting wire.

Next, plaintiff says that the Pacz *process* is *cheaper* than the Schaller process. That may be true, but of what benefit can that be to *product* claims?

Finally, plaintiff's argument necessarily implies that Schaller will produce one crystal miles long because the patent discloses a *continuous* process and even a small spool contains thousands of feet of continuous tungsten filament.

wire. The absurdity of the contention is self-evident, and it is obvious that the product claims are invalid in view of the Schaller patent.

Kruger Patent No. 1,154,701 (R. 304).

This patent is for a process of producing drawn tungsten filaments, by adding to the tungsten boracic acid or other boron compound.

The Pacz patent originally stated (R. 248, lines 52 *et seq.*) that a sagless filament could be obtained by adding a solution of boric acid to WO_3 (tungstic oxide).

During the California suit the Kruger patent was set up as an anticipation. Undoubtedly because thereof, and the consequent realization of the invalidity of the Pacz product claims a disclaimer was filed of the use of "a solution of boric acid to chemically pure WO_3" to produce non-sagging filament.

This disclaimer may have been effective insofar as Pacz *process* claims are concerned. But it could not save the *product* claims of the patent. The disclaimer does not say that the addition of boric acid will *not* produce the sagless filament of the patent. In view of Pacz' oath at the time the application was filed no one but he can deny that it does, *and he has never denied that it does. He has merely disclaimed any right that he might have had to a monopoly to the use of the boric acid process.*

The fact is that boric acid *does* produce the *same product* as the Pacz process which is still claimed.

Defendant has *proved* through Padowicz (Q20, *et seq.*, R. 177) that following strictly the boric acid process disclaimed by Pacz, one gets at least as good results as with the other process of the Pacz patent, as evidenced by the photographs appearing in the lower portion of Exhibit I

and by the lamp Exhibit WW. In comparing the results, Padowicz found (Q24, R. 178) that:

> "It was very similar. There is essentially no significant difference between them."

Then comparing the boric acid process lamp WW with one of the alkali-silicate process lamps, Exhibit TT, Padowicz says:

> "The one with the boric acid has slightly less sag than that of the Pacz" (Q37, R. 179).

As to offsetting (Q38, Rec. 179):

> "both of them showed some offsetting after approximately 700 hours equivalent.
>
> Q39. About the same degree on the offsetting? A. They are about the same degree."

No part of this testimony was rebutted and plaintiff produced no wire made in accordance with the boric acid process.

The disclaimer entitles defendant to make a filament in accordance with the boric acid process, and the rebutted testimony of Laise is that all filaments made for the defendant contain a boron compound. In spite of this, plaintiff could assert, and in fact does assert, infringement of the *product* claims *regardless of the process by which the filament is made.* Obviously, therefore, the product claims of the Pacz patent are invalid in view of the prior Kruger patent.

Conclusion on the subject of anticipation.

It is submitted that the Pacz patent is wholly invalid because of anticipation by and want of patentable invention over the prior published art.

POINT VI.

The product claims of the Pacz patent are invalid because of prior knowledge and use.

Certain phases of this matter have been referred to in the preceding points of argument. Brief amplification in certain respects, however, is necessary. In addition to the wide-spread commercial use of the coiled filament Langmuir lamp, and of the Battersea wire, by plaintiff itself, there were two instances of prior knowledge and use by others.

The first of these was by the Westinghouse Electric and Manufacturing Company, one of plaintiff's licensees. The other was by the Independent Lamp and Wire Company, an independent manufacturer of lamps which was acquired by plaintiff after extensive patent litigation instituted by plaintiff on the Langmuir and Coolidge patents.

(a) The Westinghouse *use.*

Cowles was employed by the Westinghouse Company until 1912 and produced wire by "doping" the tungsten, *i. e.*, adding all kinds of beneficial substances including sodium silicate, potassium silicate, *i. e.*, alkali silicates (R. 118). This was done to get better filament than by the Battersea process, and it was practiced with squirted as well as with drawn wire. The wire was used in the regular commercial operations of the company in manufacturing lamps.

Exhibits N, O and O^1, O^2 and O^3 are microphotographs of tungsten wire and metal *made by Cowles while employed by Westinghouse,* Exhibits O and O^1 are of tungsten doped with silicate and with sodium. They made satisfactory non-sag wire (Q49, R. 122).

Exhibits O^2 and O^3 (R. 124)

> "show the same irregular crystalline structure that we were working for and wanted to get so as to prevent offsetting and prevent drooping and sagging of the filament."

The genuineness of the photographs he produced was not disputed by anyone.

Cowles also produced a corresponding set Exhibits P to P3 of official General Electric microphotographs of the 1922 Pacz metal. The genuineness or correctness of the photographs was not challenged. A comparison between the General Electric photographs (of Pacz wire of 1922) and the Westinghouse photographs (of its "doped" wire of 1912) shows that they are *identical* in grain structure (R. 125, 126).

Laise corroborated Cowles that Westinghouse was doping tungsten with alkali silicate long before the Pacz invention. See, for instance, Qs. 24 to 31, pp. 204, 205.

Laise produced a lamp specification and drawing showing the type of lamp made by Westinghouse by the thousands in 1912 with this filament (Qs. 41, 42, R. 145).

The prior knowledge and commercial use by Westinghouse, therefore, constitutes a statutory bar to the validity of the claims in suit.

(b) The Independent Lamp & Wire Company *use*.

The Independent Lamp & Wire Company manufactured lamps at the rate of 35,000 a day (Laise, Q8, R. 142).

Both Cowles and Laise had been associated with this company, and were primarily interested in the production of tungsten lamp filaments from about 1912 until 1920.

Cowles said that he made the same kind of tungsten wire as with the Westinghouse Company, viz., tungsten "doped" with an alkali silicate, to prevent sagging (see Qs. 20, 21, R. 119).

He produced a memorandum Exhibit S (R. 301) which was sent to him by Laise on July 13, 1916, *i. e.*, about seven months prior to the filing of the Pacz application. The memorandum is worth quoting in its entirety:

Non-Sagging Filament Wire. Mr. Cowles:

> "Kindly prepare a number of small batches of metal, about 500 grams to a lot for the production of non-sagging filament wire. *These batches to contain small percentages of addition products, such that these products will not interfere with the working quality of the metal and yet impart that non-sagging effect to the wire.*
>
> I would suggest that we try small percentages of *silica,* of titanium, of lime, of boron or any other addition product that you might consider beneficial for this purpose.
>
> When you have five lots of these special metals ready, let me have them so that I can have them treated and swaged, and thus be better able to tell the relative working quality of the metals." C. A. Laise.

Cowles testified that he carried out the instructions and Laise identified the memorandum.

Laise started with the Independent Lamp & Wire Company late in 1914, and when he arrived there (Q36, R. 145):

> "they were also adding a beneficial addition to the tungsten, and they were using the Battersea crucible method for the manufacture of tungsten filament.
>
> Q37. And after you went with them what change, if any, did you make in their process of producing filaments for lamps? A. We continued the use of the

Battersea crucible method for about a year and a half, and simultaneously we also practiced the prior process of adding beneficial additions, especially to the oxide, and firing that oxide in a silicate tube.

Q38. And what beneficial addition did you add? A. We added lime, we added potassium silicate and we added thorium nitrate. That is, we made four different grades of wire, one being made with thorium nitrate to produce a thoriated filament, *another being made by the Battersea method, to produce a filament for coiled filament lamps,* another being made by the addition of lime and firing in the silicate tube, also to produce a coiled filament lamp."

He produced a lamp, Exhibit Z, and testified (R. 146).

"Q52. Do you know how long that lamp has been burned? A. That lamp burned 100 hours.

Q53. Has it sagged, has the filament sagged? A. It is a commercial non-sag filament.

Q54. And when, as near as you know, if you know, was that lamp built? A. *This particular lamp was built in October, 1916.*

Q56. How was the filament made? A. The filament was made by the Battersea crucible method and the Coolidge wire method."

Laise introduced a number of other lamps made by the Independent Lamp & Wire Company in 1916 and before (Exhibits AA to EE, p. 210). In Exhibits AA and BB the filament has not sagged (Q66, R. 148). Exhibit CC is a nitrogen-filled lamp made in 1916. The filament was produced by the Battersea process, and has not sagged although it was burned 500 hours, and it has been in Laise's possession since 1916 (Qs. 68-72, R. 148).

Exhibit Z is supported by a blueprint, Exhibit DD, dated April 27, 1915, which depicts the same type of lamp as the Independent Lamp & Wire Company manufactured in 1915

(Qs. 73-76, R. 148). These lamps were manufactured in large quantities (Q78), and Exhibit Z is typical as to non-offset and non-sagging characteristics (Qs. 79-82, R. 149).

Spina, who was also an employee of the Independent Lamp & Wire Company, identified Exhibit Z as of the vintage of 1916 (R. 185), and Exhibit CC as of the vintage of 1913.

Spina also produced a lamp, Exhibit AAA, which was made by the Independent Lamp & Wire Company in 1915, which he has had ever since, and which satisfies all the requirements of all the claims in suit (R. 185). *This lamp alone invalidates the product claims of the Pacz patent.*

Defendant has established that both the Westinghouse Company and the Independent Lamp & Wire Company have manufactured and sold large quantities of incandescent electric lamps having drawn tungsten filaments, and which neither offset nor sagged substantially during their normal commercial lives. Such manufacture and sale occurred prior to the filing date of the Pacz application, long prior to it. The patent is therefore invalid for this reason.

Plaintiff's contentions concerning prior knowledge and use.

As to both instances of prior knowledge and use above set forth, plaintiff repeats, with many citations of and quotations from authority, that this defense must be established beyond a reasonable doubt. We have no quarrel with that proposition of law. We recognize it fully, and assert, in response, that not only has this defense been established by competent evidence, contemporaneous records, etc., of wholly disinterested witnesses, beyond a reasonable doubt, but also that it has been established so conclusively that plaintiff saw the futility of attempting to rebut it, although

one prior use was by its licensee, and the other by a company which it had acquired.

While plaintiff so earnestly stresses this rule of proof "beyond a reasonable doubt" as far as defendant's case is concerned, it places its own evaluation of what the rule means when it is faced with the necessity of carrying the date of Pacz' alleged invention back to a date earlier than the application date. Of course, the same exacting quantum and quality of proof is necessary to carry back the date of an invention as is required to establish the defense of prior knowledge and use. (*United Shoe Machinery Corp.* v. *Brooklyn,* 77 Fed. (2) 263.)

Merely on the authority of its expert witness's say-so and without any kind of corroboration, plaintiff insists throughout its brief that the Pacz invention (for which the application was filed on February 20, 1917) was made in 1915 (*e. g.,* plaintiff's brief pp. 10, 40, 42, etc.).

With specific reference to the prior commercial operations of the Westinghouse Company, plaintiff predicates its criticism of the Cowles testimony on the assertion that records, filaments, lamps, and microphotographs were not produced by Cowles. Here, again, plaintiff misstates the facts. As already pointed out, Cowles *did* produce microphotographs of tungsten wire and metal made by the Westinghouse Company while he was there (Exhibits N, O, O^1, O^2, and O^3). Obviously, defendant did not have available filaments, lamps, etc., of plaintiff's licensee even if any were still in existence. Likewise, his testimony was corroborated by Laise. The testimony of both as to the Westinghouse operations was further corroborated by the microphotographs, etc., made for the purposes of the suit. *None of this testimony was refuted by plaintiff.*

With respect to the Independent Lamp & Wire Company, and contrary to plaintiff's argument in its brief, complete corroboration was had not only from written records and documents (such, for example, as Defendant's Exhibit S), but also by lamps—actual physical structures (Defendant's Exhibits Z, AA to AE and AAA).

Apparently, plaintiff's only reply to the Spina lamp is that it is a single instance. Aside from the fact that such reply ignores the other instances above referred to, we direct attention to this Court's particularly apt language in *Egbert* v. *Lippman,* 104 U. S. 343, 346:

> "The use of a great number may tend to strengthen the public use but one well defined case of public use is just as effective to annul the patent as many."

POINT VII.

The Pacz patent is invalid because of double patenting.

This defense is predicated upon the prior Pacz Patent No. 1,299,017, granted April 1, 1919, on application filed May 25, 1914 (R. 266). The application for the patent in suit was filed on February 20, 1917.

The first Pacz patent shows and describes a method of producing a filament which will neither sag nor offset; and the patent claims the product obtained by such a process (see, for example, claims 13 to 17). This is now admitted (Plaintiff's Brief p. 35).

The earlier Pacz patent (prepared, filed and prosecuted by and issued to the same assignee), described, was directed to cover and did cover the invention of the product claims of the second Pacz patent.

The claims of the first Pacz patent differ from the claims of the Pacz patent in suit in language; but that is immaterial. Both patents assert as their objective the production of a sagless and non-offsetting filament. Both patents assert that they attain their objective. Both patents claim the resulting product, and in both that product consists of *a substantially pure tungsten filament in an incandescent lamp, which alone necessitates that it be formed of grains of such size and contour as to make the filament substantially sagless and non-offsetting.* Therefore, regardless of terminology, the product claimed by both patents inevitably and unavoidably must be and, in fact, the same.

It follows, therefore, that the second patent to issue—the Pacz patent in suit—is invalid because of double patenting, under well recognized authority.

> *Miller* v. *Eagle Manufacturing Co.*, 151 U. S. 186;
> *Otis Elevator Co.* v. *Portland Co.*, 127 Fed. 557;
> *Caldwell* v. *Firestone Tire & Rubber Co.*, 13 Fed. (2d) 483, 488.

Plaintiff's contentions on this point.

The only argument plaintiff advances in its attack on the legal effect of the earlier Pacz patent, which requires comment on our part, is that contained in the footnote of page 34 of its brief. There plaintiff seeks to convey the same erroneous idea with respect to Pacz that it expends so much effort in its brief with respect to Coolidge. Plaintiff seeks to induce this Court to the belief that the first Pacz patent is directed to a *finely granular* structure. This, of course, is not the fact. Plaintiff's brief quotes from a passage of the earlier Pacz patent in which it is stated:

> "*Rods* produced from the metal, as above described, when subjected to this test, had cross sections which were finely granular."

Now, it is obvious that Pacz, in his earlier patent, specifically referred to the *rod* (ingot) of the metal, as distinguished from a finished *filament* in a finished lamp (see p. 3 of the patent, lines 121 *et seq.*). We therefore turn to the Pacz patent in suit to see if it furnishes any information as to the crystalline structure of the tungsten *rod* or ingot (prior to drawing), as distinguished from the *filament* in the finished lamp, and we find the following (p. 2, line 77):

> "The tungsten *ingots* produced according to my invention usually have *fine grains,* as for example, between 2500 and 6500 grains per square m.m.".

It will be seen, therefore, that Pacz in his first patent in the passage quoted from in plaintiff's brief on page 38, and Pacz in his patent in suit, *say the same thing,* namely that the *ingot* is *fine grained.*

In this connection we call attention also to Dr. Jeffries' testimony (R. 16) who also differentiated between *rods* and the drawn filament wire.

The utilization of this passage of the first Pacz patent by plaintiff in its brief to support the assertion that the resulting product, when used as a *filament* in a lamp, is a *fine grained* structure, becomes not only wholly unjustified, but also becomes astonishing when we turn to the testimony of Dr. Jeffries in direct examination (R. 220) in commenting upon the grain structures of *ingots* as illustrated in Exhibits P, P^1, P^2, and P^3. He stated:

> "These are typical structures of the ingots and, therefore, *nothing can be predicted as to the non-sagging or non-offsetting nature of the filament which might be produced from an ingot with such a structure.*"

Plaintiff's argument, based upon this apparent attempt to mislead, becomes even more astonishing when we note

that in the second footnote on page 24 of its brief, as well as on page 38 plaintiff itself argues the difference between granular structure of an *ingot* and of a finished *filament,* in discussing defendant's Exhibit O^2, and on page 38 quotes from Dr. Jeffries' testimony, with italicized portions therein, which we here reproduce:

> "That appears to be a typical micrograph of a tungsten *ingot structure.* This particular ingot happens to be fairly coarse grained as indicated by the magnification shown on the back of the microphotograph mounting. It was supposed to be 200 magnification. *The structure of the ingot has little relation to the structure in the finished filament.* This is a structure before any mechanical working. It cannot be said that this structure is typical of a non-sagging, non-offsetting structure."

In view of the foregoing, plaintiff's attack on the legal effect of the first Pacz patent fails utterly.

In the Courts below plaintiff indignantly denied that the first Pacz patent had anything whatever to do with producing a sagless filament. Apparently, realizing the futility of continuing such a denial in the face of the plain language of the specifications of the first Pacz patent, plaintiff's change of position has resulted. This change, however, has necessitated the assertion that the first Pacz patent, *which has now expired,* but which, throughout its life, remained as an open and ever ready threat to the entire industry, was for an "unsuccessful attempt" to produce a sagless filament. In other words, plaintiff repudiates and damns its own patent (after its expiration), although the patent in suit glorifies it by reference to it (see R. 247, lines 79 *et seq.*) and asserts that the patent in suit is an improvement on the method disclosed in the prior patent. Even its

ever ready and obliging expert Jeffries testified (R. 54) that the filament of first Pacz patent sagged less than the filaments which preceded it, such as the Coolidge filament which was used in millions of coiled filament Langmuir lamps.

Conclusion.

The Pacz patent should be held invalid.

Respectfully submitted,

SAMUEL E. DARBY, JR.,
PAUL KOLISCH,
Counsel for Respondents.

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FILAMENT PRODUCED IN ACCORDANCE WITH PACZ PATENT.

Fig. 1 (Exhibit I)
By North & Padowicz

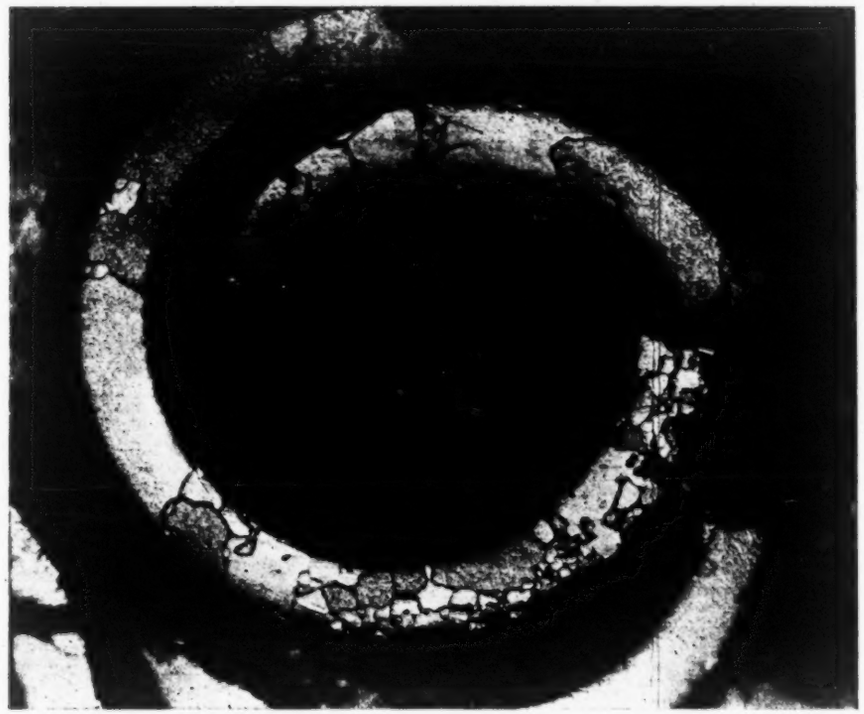


Fig. 2-A (Exhibit T)
By Laise

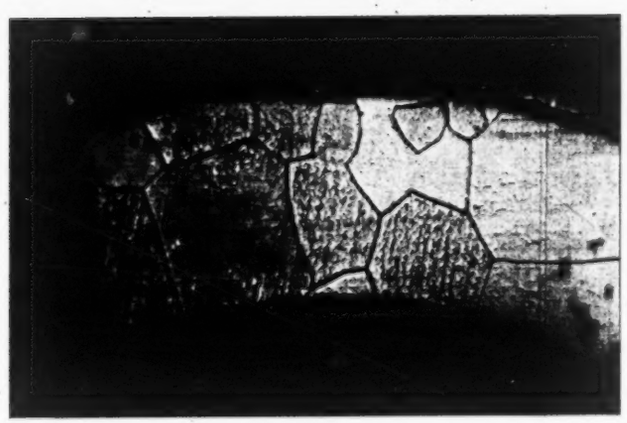


Fig. 2-B (Exhibit T)
By Laise

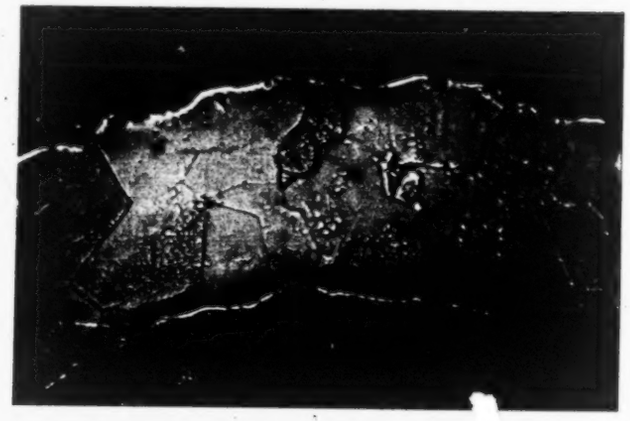


Fig. 3 (Exhibit L—Kober)
By General Electric in 1923

Fig. 4 (Exhibit Q—Cowles)
By General Electric in 1922

FILAMENT PRODUCED IN ACCORDANCE WITH COOLIDGE PATENT (BATTERSEA)

Fig. 5 (Exhibit J) By Spielholz

Fig. 6-A (Exhibit K) By Laise

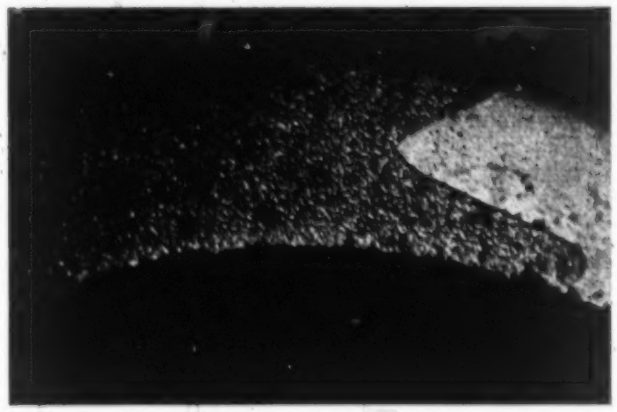
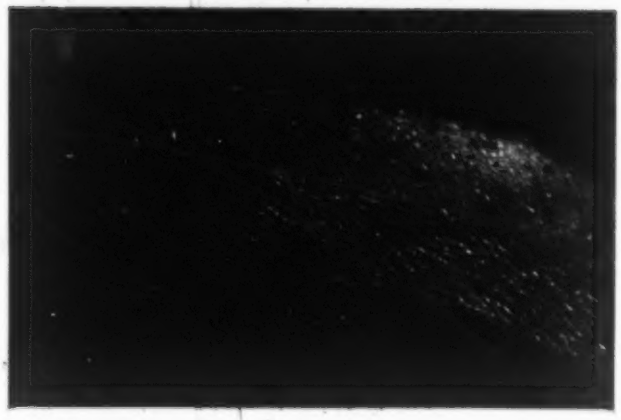


Fig. 6-B (Exhibit K) By Laise



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SUPREME COURT OF THE UNITED STATES.

No. 453.—October Term, 1937.

General Electric Company, Petitioner *vs.* Wabash Appliance Corporation, Abe Adler and Abe M. Parker.	On Writ of Certiorari to the United States Circuit Court of Appeals for the Second Circuit.

[May 16, 1938.]

Mr. Justice Reed delivered the opinion of the Court.

Petitioner, General Electric Company, brought this patent infringement suit based on Pacz Patent No. 1,410,499, relating to a tungsten filament for incandescent lamps. The patent, issued March 21, 1922, on an application filed February 20, 1917, contains process and product claims; only the latter are here involved. The District Court for Eastern New York held claims 25, 26 and 27 valid and infringed, and gave petitioner a decree for an injunction and accounting. 17 F. Supp. 901. The Court of Appeals for the Second Circuit held that petitioner's product was anticipated by filament produced under the teachings of the Coolidge Patent No. 1,082,933, and reversed with directions to dismiss the bill of complaint. 91 F. (2d) 904. This decision conflicted with that handed down by the Court of Appeals for the Ninth Circuit, *Anraku* v. *General Electric Co.*, 80 F. (2d) 958, which held the same claims valid and infringed. To resolve the conflict, this Court granted certiorari,— U. S. —.

In incandescent lamps, the tungsten filament, through which the electric current passes, grows more luminous than the carbon filament of the early days of the art. There were faults of "offsetting" and "sagging", however, affecting the efficiency of the first tungsten filaments. "Offsetting" occurs when, during heating in the use of the lamp, the filament forms crystals which extend their boundaries across the entire diameter of the filament, substantially perpendicular to its axis. The crystals in the filament thus come to have an appearance, somewhat analogous to the joints in a bam-

boo rod. Lateral slipping of the crystals reduces the cross-sectional area at the point of contact of the crystals with the result that the temperature at that point is increased, thus hastening the burnout, and the filament is weakened. "Sagging" is a change of position by the filament during incandescence. It elongates and thus is forced out of the plane it occupied between fixed supports. Sagging has many objections. The sagging filament may touch the glass and end the life of the lamp. In gas-filled lamps, when sagging causes the coils to spread apart, the gas flows in between the coils and unduly cools the filament. Combatting sagging by additional supports is also said to cool the filament, and reduce electrical efficiency.

Pacz undertook to remedy these faults. He carried out many experiments, and his 218th effort, made while he was in the employ of petitioner company, yielded the discovery disclosed by the patent in suit. The specification asserts that by means of his invention "the sagging is substantially eliminated and 'offsetting' of the filament is substantially prevented, during a normal or commercially useful life of the lamp." He brings "into intimate association with tungsten a material [an alkaline silicate] which will have the desired influence upon the grain growth of the metal." The specification continues as follows:

"When the metal reaches the temperature at which extensive grain growth would ordinarily take place, the presence of this material intimately associated with the tungsten particles has a marked effect on the shape and size of the tungsten grains. The ingot of tungsten thus produced, whether it be due to the fact that the grains have not reached the equilibrium grain size or to other causes, is particularly susceptible to grain growth during subsequent heat treatments.

"The probable reason why filaments made according to my invention do not sag, is that the structure is comparatively coarse grained. The coarse grained filament produced by means of my invention does not 'offset' so as to cut short the life of the lamp appreciably."

The District Court found that Pacz's patent exhibited novelty and invention; that Pacz produced large crystals early in the life of the lamp; that although coarse-grained, and thus non-sagging, filaments meant "offsetting" to the art, where it was "common knowledge" that grains large enough to extend across the filament induced slippage, Pacz procured a particular kind of coarse-grained

filament which did not "offset" because of the nature of the boundaries of the grains, their contour being "a very important element."

The Circuit Court of Appeals held that the Pacz product was anticipated by Patent No. 1,082,933, issued December 30, 1913, to William D. Coolidge for a process of producing ductile tungsten for incandescent electric lamp filaments and for the product itself.

The question before this Court is the validity of the claims in suit. Claim 25, which is typical,[1] reads as follows:

"25. A filament for electric incandescent lamps or other devices, composed substantially of tungsten and made up mainly of a number of comparatively large grains of such size and contour as to prevent substantial sagging and offsetting during a normal or commercially useful life for such a lamp or other device."

We need not inquire whether Pacz exhibited invention, or whether his product was anticipated. The claim is invalid on its face. It fails to make a disclosure sufficiently definite to satisfy the requirements of R. S. § 4888, 35 U. S. C. § 33. That section requires that an applicant for a patent file a written description of his discovery or invention "in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains . . . to make, construct, compound and use the same; . . . and he shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery." We may assume that Pacz has sufficiently informed those skilled in the art how to make and use his filament. The statute has another command. Recognizing that most inventions represent improvements on some existing article, process or machine, and that a description of the invention must in large part set out what is old in order to facilitate the understanding of what is new, Congress requires of the applicant "a distinct and specific statement of what he claims to be new, and to be his

1 "26. A drawn filament for electric incandescent lamps or other devices, composed substantially of tungsten and made up mainly of a number of comparatively large grains of such size and contour as to prevent substantial sagging and off-setting during a normal or commercially useful life for such a lamp or other device.

"27. A filament for electric incandescent lamps or other devices, composed of tungsten containing less than three-fourths of one percent of non-metallic material and made up mainly of comparatively large grains of such size and contour as to prevent substantial sagging or offsetting during a normal or commercially useful life for such a lamp or other device."

invention."[2] Patents, whether basic or for improvements, must comply accurately and precisely with the statutory requirement as to claims of invention or discovery. The limits of a patent must be known for the protection of the patentee, the encouragement of the inventive genius of others and the assurance that the subject of the patent will be dedicated ultimately to the public.[3] The statute seeks to guard against unreasonable advantages to the patentee and disadvantages to others arising from uncertainty as to their rights.[4] The inventor must "inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not."[5] The claims "measure the invention."[6] Patentees may reasonably anticipate that claimed inventions, improvements and discoveries, turning on points so refined as the granular structure of products require precise descriptions of the new characteristic for which protection is sought. In a limited field the variant must be clearly defined. This was one in a series of patents. *United States* v. *General Electric Co.*, 272 U. S. 476, 480.

Pacz did not adequately set out "what he claims to be new." The tungsten filament "made up mainly of a number of comparatively large grains," differentiates the claimed invention from tungsten drawn into a single crystal (Schaller No. 1,256,930), and from Coolidge's fine-grained thoriated filament, but serves aptly to describe the product of earlier manufacture, with its large regular grains subject to offsetting. According to the District Court, the earliest, so-called "squirted," tungsten filaments, also "consisted of comparatively large crystals, many of which were large enough to extend clear across the filament, but they shifted." 17 F. Supp. at 902. The failure of the patentee to make claim to a distinct improvement is made clear by comparison of the language of the claims under consideration with descriptions of offset difficulties recognized by other inventors.[7]

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2 Merrill *v.* Yeomans, 94 U. S. 568, 570.

3 Cf. The Incandescent Lamp Patent, 159 U. S. 465, 474ff.

4 See Brooks *v.* Fiske, 15 How. 212, 215.

5 Permutit *v.* Graver Corp., 284 U. S. 52, 60; Grant *v.* Raymond, 6 Pet. 218, 247.

6 Continental Paper Bag Co. *v.* Eastern Paper Bag Co., 210 U. S. 405, 419.

7 "When this crystallization becomes excessive the crystals may, in the case of a filament, become so large as to extend across the entire section of the

The claim further states that the grains must be "of such size and contour as to prevent substantial sagging and offsetting" during a commercially useful life for the lamp. The clause is inadequate as a description of the structural characteristics of the grains. Apart from the statement with respect to their function, nothing said about their size distinguishes the earliest filaments, and nothing whatever is said which is descriptive of their contour (termed by the District Court a "very important element"), not even that they are irregular.

The claim uses indeterminate adjectives which describe the function of the grains to the exclusion of any structural definition, and thus falls within the condemnation of the doctrine that a patentee may not broaden his product claims by describing the product in terms of function.[8] Claim 25 vividly illustrates the vice of a description in terms of function. "As a description of the invention it is insufficient and if allowed would extend the monopoly beyond the invention."[9] The Court of Appeals for the Ninth Circuit relied on the fact that the description in the claims is not "wholly" functional.[10] 80 F. (2d) 958, 963. But the vice of a functional claim exists not only when a claim is "wholly" functional, if that is ever true, but also when the inventor is painstaking when he recites what has already been seen, and then uses conveniently functional language at the exact point of novelty.[11]

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filament and thereupon the sections may move laterally upon each other and produce the condition known as "offsetting". I shall hereinafter describe more in detail the special method which I employ for minimizing the loss in ductility and for preventing this offsetting effect." Coolidge Patent, No. 1,082,933.

"Such crystals seem to increase in size in much the same manner as crystals formed in liquid solutions, and, if the crystals become large enough to extend almost or entirely across the filament, adjacent crystals tend to slip along their cleavage planes thereby giving the filament the offset or faulted appearance above referred to." Myers and Hall patent, No. 1,363,162.

[8] Holland Furniture Co. *v.* Perkins Glue Co., 277 U. S. 245, 256-258, and cases cited.

[9] 277 U. S. at 258.

[10] Presumably that court would have assented to the condemnation of other product claims of the patent in suit, containing even less description than the ones under discussion:

"28. A coiled filament composed substantially of tungsten and capable of use in an electric incandescent lamp without either substantial sagging or offsetting during a normal or commercially useful life.

"29. A coiled filament composed mainly of drawn tungsten and capable of use in an electric incandescent lamp without substantial sagging and without substantial offsetting during a normal or commercially useful life."

[11] See Gynex Corp. *v.* Dilex Institute, 85 F. (2d) 103, 105; Davis Co. *v.* New Departure Co., 217 Fed. 775, at 782.

A limited use of terms of effect or result, which accurately define the essential qualities of a product to one skilled in the art, may in some instances be permissible and even desirable, but a characteristic essential to novelty may not be distinguished from the old art solely by its tendency to remedy the problems in the art met by the patent. And we may doubt whether the language used in Claim 25, taken by itself, conveyed definite meaning to those skilled in the art of incandescent lighting.[12]

The Circuit Court of Appeals below suggested that "in view of the difficulty, if not impossibility, of describing adequately a number of microscopic and heterogeneous shapes of crystals, it may be that Pacz made the best disclosure possible, ..." But Congress requires, for the protection of the public, that the inventor set out a definite limitation of his patent; that condition must be satisfied before the monopoly is granted.[13] The difficulty of making adequate description may have some bearing on the sufficiency of the description attempted, but it cannot justify a claim describing nothing new except perhaps in functional terms. It may be doubted whether one who discovers or invents a product he knows to be new will ever find it impossible to describe some aspect of its novelty.

The product claims here involved cannot be validated by reference to the specification. Assuming that in a proper case a claim may be upheld by reference to the descriptive part of the specification in order to give definite content to elements stated in the claim in broad or functional terms,[14] the specification of the Pacz

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[12] There is no showing whether, under established principles in the science, the language indicated grains extending across the width of filament, and if so whether the boundaries were irregular, or regular but not perpendicular to the axis of the filament; or whether the language indicated grains larger than the fine grains of Coolidge's thoriated filament but not large enough to extend across the entire section, and if so what type of boundaries existed.

Indeed, those merely skilled might have suspected the absence of crystals large enough to extend across the entire section of the filament, in view of the efforts of other patentees to avoid such crystals, (Coolidge, No. 1,082,933, p. 2, l. 13; Myers *v.* Hall, No. 1,363,162, p. 1, l. 56), and in view of the "common knowledge in the art that where grain boundaries, large enough to extend across the filament, were produced, there would be bound to be slippage" (17 F. Supp. 901, at 903); yet those are the crystals found in respondent's lamps.

[13] Different considerations may apply under the Act of May 23, 1930, c. 312, § 2, 46 Stat. 376, 35 U. S. C. § 33, providing that no "plant patent shall be declared invalid on the ground of non-compliance with this section if the description is made as complete as is reasonably possible."

[14] Compare Mitchell *v.* Tilghman, 19 Wall. 287, 391; Westinghouse *v.* Boyden Power Brake Co., 170 U. S. 537, 557-558.

patent does not attempt in any way to describe the filament, except by mention of its coarse-grained quality. Even assuming that definiteness may be imparted to the product claim by that part of the specification which purportedly details only a method of making the product,[15] the description of the Pacz process is likewise silent as to the nature of the filament product. Although in some instances a claim may validly describe a new product with some reference to the method of production,[16] a patentee who does not distinguish his product from what is old except by reference, express or constructive, to the process by which he produced it, cannot secure a monopoly on the product by whatever means produced. "Every patent for a product or composition of matter must identify it so that it can be recognized aside from the description of the process for making it, or else nothing can be held to infringe the patent which is not made by that process."[17]

Finally, the product claims may not be saved by a limitation to products produced in accordance with the process set out in the specification. This construction, though possibly of no avail against respondent, might add to the protection afforded petitioner by the process claims, if they are valid, in view of its application to filaments produced abroad. But putting aside questions as to the general propriety of such a construction,[18] unless the claim uses language explicitly referring to the method of preparation, or describing the product in phrases suggestive of that process,[19] to save the product claim in this fashion would constitute an improper

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15 Compare Holland Furniture Co. *v.* Perkins Glue Co., 277 U. S. at 255, with United States Repair & Guarantee Co. *v.* Assyrian Asphalt Co., 183 U. S. 591, at 600-601.

16 Cf. Dunn Wire-Cut Lug Brick Co. *v.* Toronto Fire Clay Co., 259 Fed. 258, 261; Trussell Mfg. Co. *v.* Wilson-Jones Co., 50 F. (2d) 1027, 1029.

17 Cochrane *v.* Badische Anilin and Soda Fabrik, 111 U. S. 293, 310. See also Hide-Ite Leather Co. *v.* Fiber Products Co., 226 Fed. 34, 36; cf. Maurer *v.* Dickerson, 113 Fed. 870, 874.

See also National Carbon Co. *v.* Western Shade Cloth Co., 93 F. (2d) 94, 97: "It has been said that a claim for a product produced by any process which will produce a like result covers the product only when made by equivalent processes. Pickhardt *v.* Packard (C. C.) 22 F. 530."

18 Steinfur Patents Corp. *v.* William Beyer, Inc., 62 F. (2d) 238, 241; Buono *v.* Yankee Maid Dress Corp., 77 F. (2d) 274, 279; Dunn Wire-Cut Lug Brick Co. *v.* Toronto Fire Clay Co., 259 Fed. 258, 261-262.

19 Smith *v.* Goodyear Dental Vulcanite Co., 93 U. S. 486; Cochrane *v.* Badische Anilin and Soda Fabrik, 111 U. S. 293, 310; Plummer *v.* Sargent, 120 U. S. 442, 448; Downes *v.* Teter-Heany Development Co., 150 Fed. 122; Hide-ite Leather Co. *v.* Fiber Products Co., 226 Fed. 34.

importation into the claim of a factor nowhere described there.[20] The claims in suit seek to monopolize the product however created, and may not be reworded, in an effort to establish their validity, to cover only the products of the process described in the specification, or its equivalent.

For reasons set out, claims 25, 26, 27 are invalid. The judgment is

Affirmed.

Mr. Justice CARDOZO took no part in the consideration or decision of this case.

A true copy.

Test:

Clerk, Supreme Court, U. S.

[20] Compare McCarty *v.* Lehigh Valley R. Co., 160 U. S. 110, 116; Altoona Pub. Theatres *v.* American Tri-Ergon Corp., 294 U. S. 477, 487.